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SUJATHA SUBRAMANIAM, ESQ.
E-mail ssubramaniam@brinkshofer.com

VIA FEDERAL EXPRESS

November 15, 2002

Heather Steiner Brown
12044 Clearview Lane
Holland, MI 49424

Re: U.S. Patent Application : **Electric Control For Automobile
Headlights**
Serial No. : 10/025,585
Attorney Docket No. : 10541-595
Visteon Case No. : V200-0900

Dear Ms. Brown:

Enclosed is a copy of the patent application that we filed on December 18, 2001 for the above referenced application naming you as the inventor. We forwarded the application to your Ann Arbor address and were informed you were no longer at that address. We have received your new address from Visteon.

Enclosed is a Declaration and Power of Attorney and two original Assignments to Visteon Global Technologies, Inc. (one will be recorded in the U.S. Patent and Trademark Office and one will be filed at Visteon Global Technologies, Inc.). Please review these formal papers carefully and verify that your name and address is correct. Please sign and date these documents where indicated and fax them back to our office by **November 21, 2002** for filing with the U.S. Patent and Trademark Office.

If you have any questions, please do not hesitate to contact me.

Sincerely,


Sujatha Subramaniam

SSUB/sc
Enclosures

cc Steven L. Oberholtzer

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Group Art Unit: Unknown)
Examiner: Unknown)
Inventors: BROWN)
Serial No: Unknown)
Filed: Concurrent Herewith)
For: ELECTRIC CONTROL FOR)
AUTOMOBILE HEADLIGHTS)

INFORMATION
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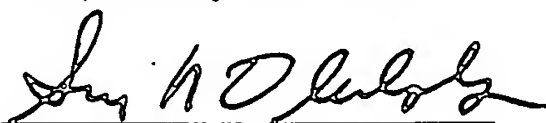
Sir:

Under the duties of disclosure, candor, and good faith of 37 CFR §1.56, the Applicant hereby submits the references listed on the attached PTO-1449 form for consideration by the Examiner. In the opinion of the Applicant, the pending claims are patentably distinct from the listed references.

Under 37 CFR §1.97(b)(1), no fee should be required. If a fee is required, however, please charge any such fee pursuant to 37 CFR §1.16 or §1.17 to deposit account no. 06-1500.

Respectfully submitted,

Date: December 18, 2001

By: 
Steven L. Oberholtzer
Reg. No. 30,670
Attorney for Applicant

BRINKS HOFER GILSON & LIONE
P.O. Box 10395
Chicago, IL 60610
(734) 302-6000

INFORMATION DISCLOSURE CITATION
(Use several sheets if necessary)

Docket Number (Optional)
10541-595

Application Number
Unknown

Applicant(s)
Brown

Filing Date
Concurrent Herewith

Group Art Unit
Unknown

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	REF	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE
		4,528,851	07/16/85	Ozols			
		4,676,103	06/30/87	Nakajima			
		4,707,927	11/24/87	Hiyama			
		4,932,266	06/12/90	Bauer et al.			

**FOREIGN PATENT
DOCUMENTS**

	REF	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO

OTHER DOCUMENTS (Including
Author, Title, Date, Pertinent. Pages, Etc)

EXAMINER

DATE CONSIDERED

EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP Section 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

DECLARATION AND POWER OF ATTORNEY ORIGINAL APPLICATION

As a below named inventor, I hereby declare:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor or an original, first and joint inventor of the subject matter that is claimed and for which a patent is sought on the invention entitled:

ELECTRIC CONTROL FOR AUTOMOBILE HEADLIGHTS

the specification of which (check one)

☐ is attached hereto.

☒ was filed on December 18, 2001 as United States Application Serial No. 10/025,585 and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge my duty to disclose to the United States Patent and Trademark Office all information that I know to be material to the patentability of this application as defined in Title 37 C.F.R. § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s):

Priority Not Claimed

_____ (Number)	_____ (Country)	_____ (Filing Date)	<input type="checkbox"/>
_____ (Number)	_____ (Country)	_____ (Filing Date)	<input type="checkbox"/>
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I hereby claim the benefit under 35 U.S. C. Section 119(e) of any United States provisional application(s) listed below:

_____ (Application Serial No.)	_____ (Filing Date)
_____ (Application Serial No.)	_____ (Filing Date)
_____ (Application Serial No.)	_____ (Filing Date)

I hereby claim the benefit under 35 U.S.C. Section 120 of any United States applications(s), or Section 365(c) of any PCT International Application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C.F.R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status: patented, pending, abandoned)
_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status: patented, pending, abandoned)
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys, agents, and each shareholder, attorney of counsel, associate, and employee of Brinks Hofer Gilson & Lione, who is a registered Patent Attorney or registered Patent Agent, my attorney with full power of substitution and revocation to prosecute this application and transact all business in the United States Patent and Trademark Office connected therewith and to act on my behalf before the competent International Authorities in connection with any and all international applications filed by me.

Steven L. Oberholtzer, Reg. No. 30,670	Douglas D. Fekete Reg. No. 29,065
David D. Murray, Reg. No. 28,647	Hugo Delevie, Reg. No. 32,688
James E. Stephenson, Reg. No. 17,191	Lawrence G. Almeda, Reg. No. 46,151
Eric J. Sosenko, Reg. No. 34,440	Michael N. Spink, Reg. No. 47,107
Jeffrey M. Cox, Reg. No. 42,445	Scott M. Confer, Reg. No. 40,568
Raymond J. Vivacqua, Reg. No. 45,369	John Kajander, Reg. No. 47,693
Sujatha Subramaniam, Reg. No. 48,739	Frank Lollo, Reg. No. 48,854
Ryan Kennedy, Reg. No. 48,590	

Address all correspondence and telephone calls to:

Steven L. Oberholtzer
BRINKS HOFER GILSON & LIONE
P.O. Box 10395
Chicago, IL 60610
(734) 302-6000

Full name of sole or first inventor	Heather Steiner Brown	
Sole or first inventor's signature	Date	
Residence	Holland, MI 49424	
Citizenship	US	
Post Office Address	12044 Clearview Lane, Apt. 104, Holland, MI 49424	

ASSIGNMENT

WHEREAS, I have invented: **ELECTRIC CONTROL FOR AUTOMOBILE HEADLIGHTS**, identified as Visteon Disclosure No.: V200-0900 and Attorney Docket No.: 10541-595, and described in the application filed on December 18, 2001, as United States Application Serial No. 10/025,585.

WHEREAS, VISTEON GLOBAL TECHNOLOGIES, INC., a corporation organized under the laws of the State of Michigan and located at Suite 728, Parklane Towers East, One Parklane Boulevard, Dearborn, Michigan 48126, is desirous of acquiring an exclusive right to said invention.

For valuable consideration that we acknowledge, I hereby sell and assign to VISTEON GLOBAL TECHNOLOGIES, INC. the full and exclusive right to said invention, to all patent applications for said invention in the United States and in all other countries, and to all patents issued on said invention in the United States and in all other countries; and I hereby request the Director of the United States Patent and Trademark Office to issue all patents on said invention to VISTEON GLOBAL TECHNOLOGIES, INC, as the assignee.

Executed by:

Name	Signature	Date
Heather Steiner Brown		

ASSIGNMENT

WHEREAS, I have invented: **ELECTRIC CONTROL FOR AUTOMOBILE HEADLIGHTS**, identified as Visteon Disclosure No.: V200-0900 and Attorney Docket No.: 10541-595, and described in the application filed on December 18, 2001, as United States Application Serial No. 10/025,585.

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For valuable consideration that we acknowledge, I hereby sell and assign to VISTEON GLOBAL TECHNOLOGIES, INC. the full and exclusive right to said invention, to all patent applications for said invention in the United States and in all other countries, and to all patents issued on said invention in the United States and in all other countries; and I hereby request the Director of the United States Patent and Trademark Office to issue all patents on said invention to VISTEON GLOBAL TECHNOLOGIES, INC, as the assignee.

Executed by:

Name	Signature	Date
Heather Steiner Brown		

ELECTRIC CONTROL FOR AUTOMOBILE HEADLIGHTS

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention simplifies Adaptive Frontlighting Systems (AFS) for movable headlights for automobiles.

BACKGROUND OF THE INVENTION

[0002] Currently AFS systems consist of sensors that typically detect steering angle, vehicle speed, and other parameters that feed signals into an electronic control unit (ECU). The ECU logic processes these signals and then sends the appropriate input into stepper motors that reposition the lighting units within the headlights. The primary objective of AFS is to cause the headlights to be aimed in the direction of travel in turning maneuvers and to be aimed properly in differing vehicle loading conditions. Prior art AFS typically use an ECU located in the trunk of the automobile. Prior art systems require a large amount of wiring needed to connect all of the sensors to the ECU. It would be desirable to move the ECU to the front of the automobile, eliminate the need for one or both of the steering and speed sensors, and reduce the amount of wires in the system.

BRIEF SUMMARY OF THE INVENTION

[0003] The electric control for automobile headlights of this invention consists of an acceleration sensor that detects acceleration loads in two dimensions. The acceleration sensor of this invention includes a metallic ball surrounded by a viscous fluid encapsulated by a polycarbonate sphere. When the vehicle accelerates, either

in the longitudinal or lateral directions, a pressure transducer on the inside of the sphere will measure the pressure caused by the ball's motion against the wall of the sphere. Certain pressure levels corresponding to certain acceleration conditions will be processed by the ECU and cause the appropriate headlight movement. By sensing lateral accelerations, the acceleration sensor (or accelerometer) will replace the steering wheel sensor. This encapsulated ball system comprising the acceleration sensor will sit on top of the ECU behind the headlight system with wires connecting the sensor to the ECU.

[0004] A typical current design of AFS consists of steering, speed and instrument panel controls that feed input into an electronic unit. The ECU processes these signals and sends an input into stepper motors that adjust the position of the headlight units.

[0005] In accordance with this invention, the spherical capsule comprising the acceleration sensor sits on a polycarbonate tubular stand that is connected to an electronic control unit (ECU). This entire system is located behind the headlights of the car. Preferably, the height of the spherical capsule plus the tubular stand is approximately three inches. The friction between the ball and the fluid should be as low as possible, therefore the ball's surface coefficient of friction and the viscosity of this fluid should be low. When the vehicle accelerates forward, the sphere will push toward the rear wall of the sphere. When the vehicle turns, the sphere will push toward the side wall of the sphere.

[0006] Built into the walls of the polycarbonate sphere are two sensors. One sensor is located at the point of the sphere that faces the back of the vehicle. When the vehicle accelerates, this sensor will measure the pressure caused by the ball's

fore and aft (or longitudinal) motion against the wall of the sphere. Each level of pressure that is read by this sensor is proportional to the acceleration of the car that tend to cause the vehicle to pitch backward which causes a headlight aiming error unless compensated. These pressure readings are sent via wires to the ECU.

[0007] The ECU processes these signals and sends the appropriate signals to the stepper motors that control the headlight unit movement. This sensor replaces the steering wheel sensor found in a traditional AFS system. The other sensor in this invention is also built into the wall of the sphere capsule. When the vehicle turns, this sensor will read the position of the ball. Certain ball positions (corresponding to certain steering wheel positions) will be processed by the ECU and cause the appropriate headlight movement.

[0008] In light of the above, it is apparent that the AFS spherical sensor system of this invention enhances the early AFS system by placing the ECU closely behind the headlight to be controlled and requires fewer external inputs to operate. Furthermore, the large amount of wiring heretofore required is now not needed.

[0009] Other general and more specific aspects of this invention will be set forth in the ensuing description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIGURE 1 is a perspective view of the AFS system of this invention showing the sensor of the device mounted on the electronical control unit (ECU);

[0011] FIGURE 2 is a sectional view of the sensor as seen from the lines 2-2 in FIGURE 1; and

[0012] FIGURE 3 is a side view of an automobile and the AFS mounted to the automobile.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0013] The following description of the preferred embodiment of the invention is not intended to limit the scope of the invention that is described, but rather to enable a person skilled in the art to make and use the invention. Referring to the drawings, like reference numerals are used to designate like parts throughout.

[0014] Looking first at FIGURE 1, the AFS of the present invention is identified by reference number 11 and includes an electronical control unit (ECU) 10 mounted to the vehicle 12 in a position closely behind the headlight 14 of the vehicle 12. The spherical sensor system 15 consists of a metallic ball 16 surrounded by a viscous fluid 18 encapsulated by a polycarbonate sphere 20.

[0015] The friction between the ball 16 and the fluid 18 and the viscosity of the fluid 18 is very low. Built into the internal wall of the polycarbonate sphere 20 are two sensors 22 and 24. Sensors 22 and 24 detect pressure changes within sphere 20 exerted by viscous fluid 18. Pressure sensors 20 and 22 are located at 90 degree offset positions. Accordingly, any movement of ball 16 within sphere 20 causes associated pressure changes that can be either positive or negative pressure changes, depending on the direction of movement of the ball. It may further be possible to provide sensors 22 and 24 that are capable of measuring relative rotation between sphere 20 and ball 16. This provides another means for detecting turning of the vehicle since ball 16 will by its inertia tend to maintain stationary whereas the vehicle 12 and sphere 20 are rotated. Sensor 22 is located at the point of the ball 16 that faces the back of the sphere. This pressure sensor 24 may in many applications replace the speed sensor. Certain pressure levels will be

processed by the ECU and cause the appropriate headlight movement. When the vehicle turns, sensor 24 will read the position of the ball 16. The position sensor will replace the steering wheel sensor. Certain ball positions (corresponding to certain steering wheel positions) will be processed by the ECU and cause the appropriate headlight movement.

[0016] In addition to sensors 22 and 24 that measure pressure changes, other types of sensors could be used. For example, proximity type sensors or light wave based sensors could be used, so long as they are capable of detecting the movement of a mass such as ball 16. Moreover, it is further possible to use individual accelerometers to measure longitudinal and lateral accelerations. A simplified version of AFS 11 would measure only lateral accelerations, which could replace the need for a steering wheel angle input.

[0017] This encapsulated ball system will sit on top of the ECU 10 behind the headlight 14, with wire 26 (FIGURE 3) connecting the instrument panel 30 where the headlights are turned on and off. The ECU 10 processes signals from sensor system 15 and controls on the instrument panel 30 and sends an input into stepper motors (not shown) that adjust the position of the headlight units.

[0018] The wires 34 and 36 connect sensors 22 and 24 with the ECU 10, which signals the headlight 14 via the wiring 29.

[0019] It is pointed out that the sensor system 15 sits on the ECU 10. The height of the sensor system 15 plus the ECU 10 is approximately three inches. The friction between the ball 16 and the fluid 18 should be as low as possible. Therefore, the balls surface coefficient of friction and the viscosity of the fluid should be low.

[0020] The foregoing discussion discloses and describes a preferred embodiment of the invention. One skilled in the art will readily recognize from such discussion and from the accompanying drawings and claims that changes and modifications can be made to the invention without departing from the true spirit and fair scope of the invention as defined in the following claims. The invention has been described in an illustrative manner and it is to be understood that the terminology that has been used is intended to be in the nature of words and description rather than of limitation.

CLAIMS

1. A vehicle adaptive frontlighting system (AFS) comprising:
 - a) a movable headlight;
 - b) an electronical control unit (ECU);
 - c) an acceleration sensor;
 - d) whereby when the vehicle undergoes accelerations, said accelerations are sensed by said acceleration sensor whereby said ECU causes said movable headlight to move for aiming the headlight.
2. The AFS according to Claim 1 wherein said acceleration sensor detects acceleration in longitudinal and lateral directions.
3. The AFS according to Claim 1 wherein said sensor comprises a metal ball with a sphere filled with a fluid.
4. The AFS according to Claim 3 further including a first sensor positioned on the inside of said sphere, said first sensor being located at the back of the sphere so as to act to detect longitudinal acceleration.
5. The AFS according to Claim 4 further comprising a second sensor positioned on the inside of said sphere, said second sensor positioned on the inside of said sphere, said second sensor being located at the side of the sphere so as to act to detect lateral acceleration will act to turn the headlight.

6. The AFS according to Claim 1 wherein said AFS further comprises a switch on an instrument panel of the vehicle.

7. The AFS according to Claim 1 wherein said ECU causes said movable headlights to move without an input measuring the steering wheel angle of the vehicle.

8. A vehicle adaptive frontlighting system (AFS) for use with a movable headlight, comprising:

an electronic control unit (ECU);

an accelerator sensor for measuring lateral accelerations, whereby said ECU commands said movable headlights to move for aiming of the headlight in response to lateral accelerations.

9. The AFS according to Claim 8 further comprising said acceleration sensor for measuring longitudinal acceleration, whereby said ECU commands said movable headlight to move for aiming of the headlight in response to longitudinal acceleration.

10. The AFS according to Claim 8 wherein said AFS further comprises a switch on an instrument panel of the vehicle.

11. The AFS according to Claim 8 wherein said ECU causes said movable headlights to move without an input measuring the steering wheel angle of the vehicle.

12. A vehicle adaptive frontlighting system (AFS) for use with a movable headlight comprising:

an electronic control unit (ECU);

an acceleration sensor for measuring both lateral and longitudinal accelerations, whereby said ECU commands said movable headlight to move for aiming of the headlight in response to either said lateral or said longitudinal accelerations.

13. The AFS according to Claim 12 wherein said AFS further comprises a switch on an instrument panel of the vehicle.

14. The AFS according to Claim 12 wherein said ECU causes said movable headlights to move without an input measuring the steering wheel angle of the vehicle

ABSTRACT

An electronic control for automobile headlights utilizing a spherical sensor comprised of a metal ball surrounded by a fluid encapsulated in a spherical sensor, which is connected to the spherical sensor system. Computer controlled unit is positioned on and close behind the headlight so that the metal ball cooperate with sensors within the spherical sensor system to make the headlight go so as to follow the car during turns.

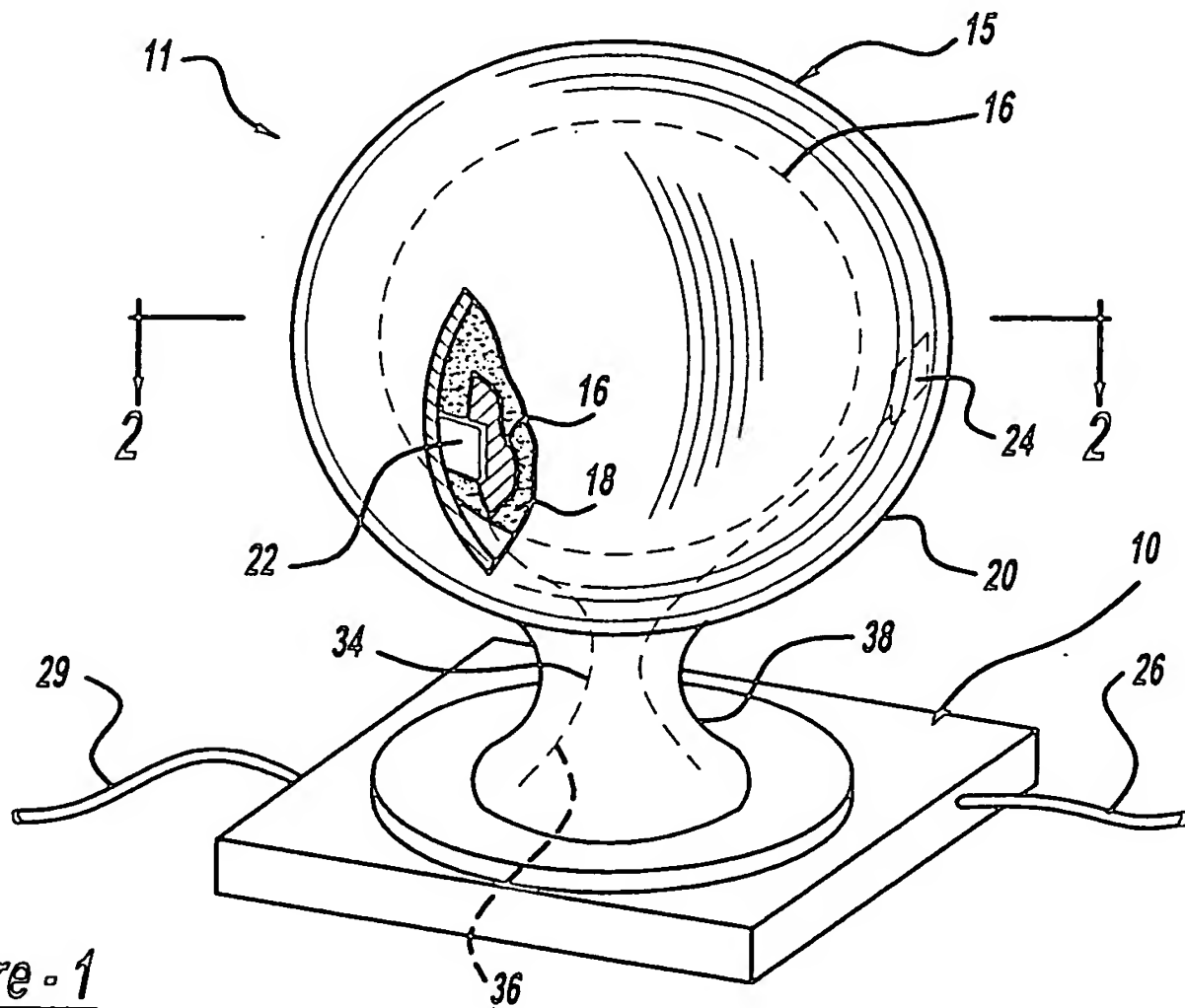


Figure - 1

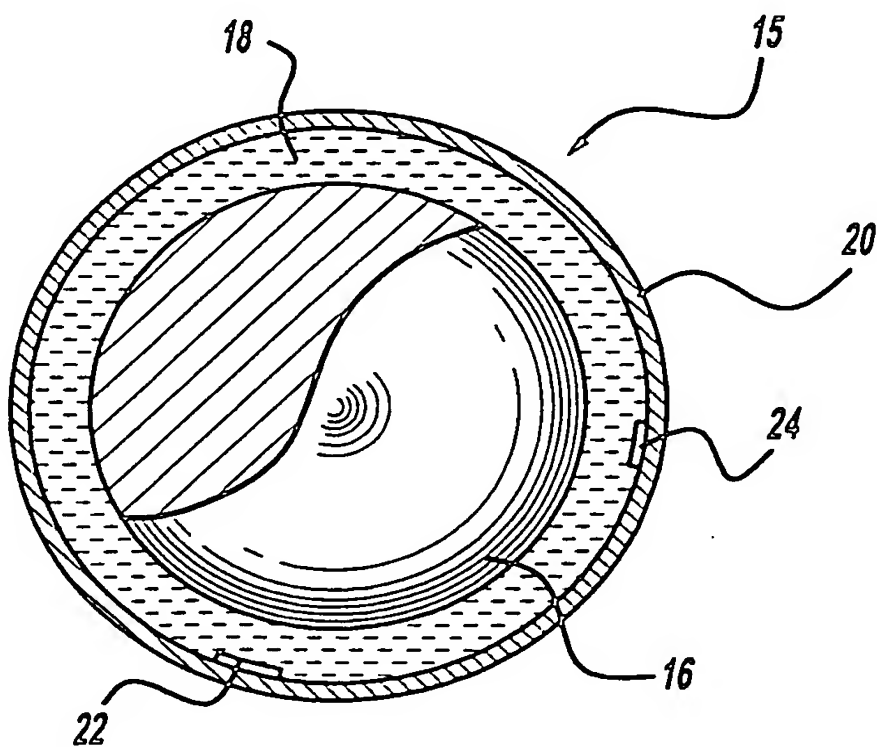


Figure - 2

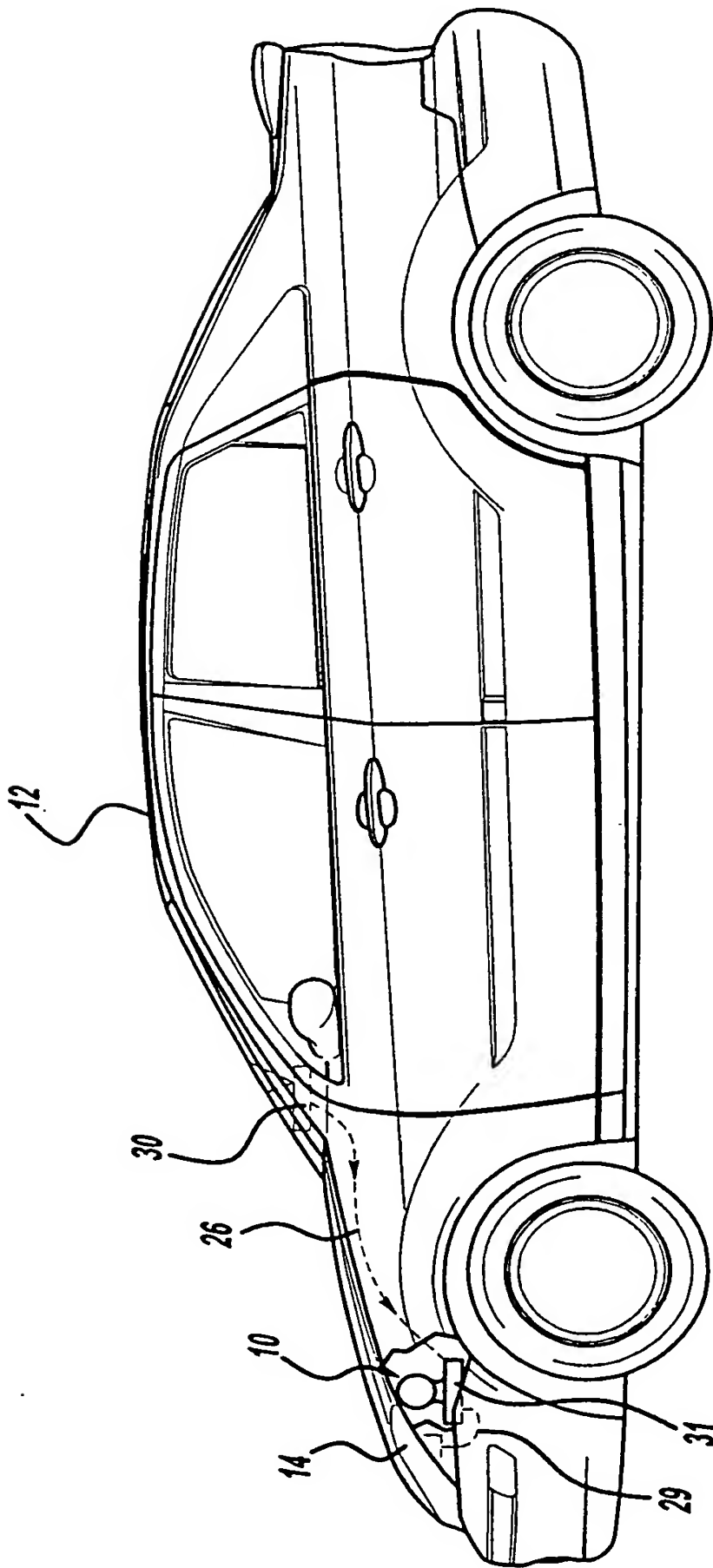


Figure - 3

DECLARATION AND POWER OF ATTORNEY ORIGINAL APPLICATION

As a below named inventor, I hereby declare:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor or an original, first and joint inventor of the subject matter that is claimed and for which a patent is sought on the invention entitled:

ELECTRIC CONTROL FOR AUTOMOBILE HEADLIGHTS

the specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge my duty to disclose to the United States Patent and Trademark Office all information that I know to be material to the patentability of this application as defined in Title 37 C.F.R. § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s):

Priority Not Claimed

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I hereby claim the benefit under 35 U.S. C. Section 119(e) of any United States provisional application(s) listed below:

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(Application Serial No.)	(Filing Date)
_____	_____
(Application Serial No.)	(Filing Date)

I hereby claim the benefit under 35 U.S.C. Section 120 of any United States applications(s), or Section 365(c) of any PCT International Application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C.F.R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status: patented, pending, abandoned)
_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status: patented, pending, abandoned)
_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status: patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys, agents, and each shareholder, attorney of counsel, associate, and employee of Brinks Hofer Gilson & Lione, who is a registered Patent Attorney or registered Patent Agent, my attorney with full power of substitution and revocation to prosecute this application and transact all business in the United States Patent and Trademark Office connected therewith and to act on my behalf before the competent International Authorities in connection with any and all international applications filed by me.

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